

ART. III. OCCURRENCE OF THE FAMILY PUPILLIDÆ
IN WEST VIRGINIA

BY STANLEY TRUMAN BROOKS AND GORDON M. KUTCHKA

TEXT-FIGURES 1-22

The members of the family *Pupillidæ*, due to their small size and complicated apertural armament, will be difficult for the inexperienced student of Conchology to study and identify. However, the beauty of these shells and the nicety of their structure will yield much pleasure to any one interested.

As an aid in the understanding of the terminology of the various apertural structures, a figure naming the folds and lamellæ is shown below. By observing the shell under some degree of magnification and by referring both to the description and the figure, the various "teeth" may be identified. By placing the shell upon a thin layer of modelling clay of the non-drying variety and manipulating it with a needle or a soft camel's hair brush, the shell may be studied or cleaned in preparation for study; the clay being "tacky," prevents the minute specimen from blowing away when the student breathes upon it. Heating the clay slightly makes it more adhesive. Shells mounted in this manner have not seemed to deteriorate from any action of the modelling clay, but it would be inadvisable to mount shells permanently in this manner without more knowledge of the chemical action of the medium. Separated specimens may be mounted upon small slips of cardboard in the same way and may be stored in vials for future study.

As with the *Carychiidæ*, these minute specimens are best collected by sifting forest loam or drift material deposited along water courses. Under a low power lens the concentrated material may be searched and the shells removed with a moist camel's hair brush. The sieve used should have at least twenty meshes to the inch, and for the *Carychiidæ* and juvenile *Pupillidæ* forty meshes to an inch. Sieves used for the testing of cement are very fine for this purpose.

If any of the specimens are living they may be allowed to dry or they may be placed in about 50 or 70% alcohol for a few hours and

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then dried. No attempt should be made to remove the minute bodies. When ready for study the shell should be cleaned of any adherent debris and the aperture cleaned with a soft brush. This cleaning should be thorough as identification depends upon seeing all of the characters of the shell.

Active forms may be found under many conditions in nature; on plants, stones, logs, and in the detritus along fences. Some species are seldom found on the ground and may be found adhering to plants from several inches to several feet above the earth. A careful watch for these small forms will reward the collector with valuable additions to his hobby as well as interesting and important data on their dispersal over North America; the ultimate aim of every precise collection.

The work of Dr. Victor Sterki and of Dr. H. H. Smith in the collecting of *Pupillidae* was mentioned in the list of donors published last year, (Brooks, 1935). Since that time other students have been active in the field. The contributions of each collector are designated by his initials, "VS," "HHS," etc.

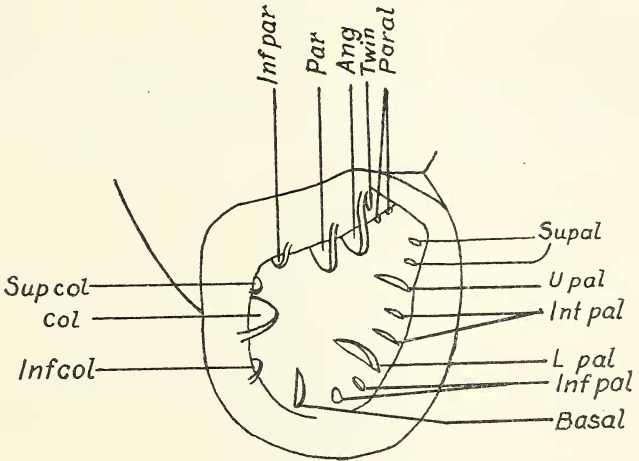
Mr. Kutchka, the junior author, spent some twelve weeks in the field and is responsible for an addition of some 16,000 specimens of land molluscs, a goodly number of which are the minute forms. Mr. G. R. Hunt, of Fairmont Teachers College, Fairmont, West Virginia, has contributed many valuable records and one new species, (Brooks and Hunt, 1936). Mr. M. S. Briscoe, of Storer College, Harpers Ferry, has been an energetic collector and has added many new records for his state. Mr. Neil D. Richmond and Mr. Paul Ridgeway, both of West Virginia, have also aided us by collections of both specimens and siftings. The senior author wishes to acknowledge the assistance that the above named individuals have rendered and has indicated the contribution of each one by the use of the initials of his name. All of those not designated are from Mr. Kutchka's findings.

In the following descriptions much use has been made of the "Manual of Conchology." In many cases adaptations, without acknowledgement, have been made from the descriptions, but those familiar with the extensive work of Dr. H. A. Pilsbry will undoubtedly recognize some of his erudite phraseology "peeping" from the lines of terminology; in all other cases full credit has been given to those drawn upon in this study. The reader should remember that this is

written and directed to the students of land snails of West Virginia and not to the trained specialist. However, the latter will undoubtedly learn some new facts in the distribution of many of these forms. In this connection, we wish to draw attention to the new records of both southern and northern species in West Virginia.

Records in the Carnegie Museum

		Pupillidæ		
1935			1936	
Genera.....	2	Genera.....	4	
Species.....	3	Species.....	18	
Localities.....	6	Localities.....	199	



Schematic figure showing armature of the Pupillid aperture.

Genus GASTROCOPTA Wollaston

Shell small, perforate or at least having a small umbilical chink present; cylindric or ovate-conic and having "angular and parietal lamellæ more or less completely united into one biramose, bifid, lobed or sinuous lamella. Columellar lamella present; palatal folds developed (except in *G. corticaria*); lip well expanded." (Pilsbry) The young shells are never toothed.

Most species of this genus, when found in nature, have the shell covered with debris; the mucus of the animal attaching it to the shell. This does not occur in *Vertigo*.

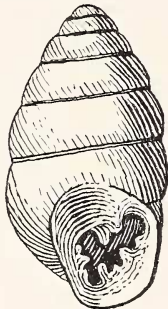
Subgenus ALBINULA Sterki

This includes the whitish, translucent species of *Gastrocopta* which have the inner end of the parietal lamella curved towards the periphery. These are the largest of the genus. Forms include *Gastrocopta armifera*, *G. contracta*, and *G. holzingeri*.

***Gastrocopta armifera* (Say)**

Shell thin, paraffin-white, glossy, oblong with the apex obtusely conic; striae weak, very oblique and irregular; whorls 6 to 6½, only moderately convex, the last compressed around the axis; aperture irregularly rounded, lip thin, expanded, the margins approaching and sometimes connected by a thin short callus across the parietal wall; angular lamella united with the parietal, joined to the outer lip; columellar lamella seen within the shell as a heavy tooth, retracted at the base; basal fold low and may be slightly indicated; the palatal folds stand on a white deposit, lower one short, pointing toward the columella, upper one shorter; above this may be a suprapalatal tubercle. Height 3.3-4.4 mm., width 2.2 mm.

Type locality: "Pennsylvania" (Say 1821); Dr. Pilsbry chooses



Germantown as the exact vicinity, as the specimens from that region most closely resemble the description.

Range: Eastern Canada, south to Florida and west to New Mexico.

West Virginia records

Greenbrier County; Alderson (NDR) (GMK)

Hampshire County; Romney

Jefferson County; Harpers Ferry, Bardane, Meyerstown, Summit Point, Keystone, Millville, Shepherdstown, Bakerton, Rippon, Mechanicstown, Engle, Bolivar, Leetown, Kearneysville, Aldridge, Morgan Grove, Jamestown, Middleway,

Johnstown, Skeetersville, Kabletown, Mount Pleasant, Bloomery, Halltown, Shenandoah Junction, Silver Grove (MSB)

Kanawha County; Tornado

Pendleton County; Franklin, Judy Gap, Upper Tract

Remarks: This is the largest species of the genus and may be recognized both by its size and color. Several specimens from Upper Tract and Franklin approach the form *clappi* (Sterki). This form is characterized by the columellar tooth being straight nearly to the base whereas in *armifera* the greatest projection forward is well above the base.

Gastrocopta contracta (Say)

Shell tapering from the body whorl to the apex, with 5 to 5½ bluish-white, convex, glossy, finely striated whorls; the body whorl straightened in its last half, pinched at the base and impressed over the lower palatals and on both sides of a low ridge close behind the peristome; aperture rounded-triangular, and almost closed by the



large teeth characteristic of this species; angular lamella arcuate, joining the lip, large, filling much of the aperture; the two palatal folds are connected by a low callus deposit, lower one larger, deeper in shell than smaller upper one; columellar lamella large, thin, very deeply placed, subvertical, the upper end curving forward; lip thin and well expanded. Height 2.5 mm., width 1.4 mm.

Type locality: "Occoquan, Virginia" (Say 1822).

Range: Eastern Canada, south to Florida and west to Mexico.

West Virginia records

Braxton County; Frametown, Gassaway

Grant County; Petersburg (PR)

Greenbrier County; Alderson (GMK, GRH, NDR)

Hampshire County; Romney

Jefferson County; Bloomery, Shenandoah City, Bardane, Meyers-town, Summit Point, Shepherdstown, Uvilla, Middleway,

Duffields, Keystone, Leetown, Reedson, Aldridge, Morgan Grove, Jamestown, Engle, Skeetersville, Kabletown, Halltown (MSB)

Marion County; Kingmont (GRH)

Mineral County; Burlington

Monroe County; Alderson, Peter's Mountain (GRH)

Monongalia County; Morgantown (HHS)

Morgan County; Largent (GRH)

Pendleton County; Franklin, Judy Gap, Upper Tract

Pocahontas County; Dunmore Spring, Marlinton, Greenbank (GMK), Mill Point (GRH)

Putnam County; Poca

Randolph County; Huttonsville

Summers County; Talcott, Wolf Creek

Remarks: This species is very characteristic; the shape, the projected half of the body whorl, and the aperture nearly closed by the teeth, easily set it apart from related forms.

***Gastrocopta holzingeri* (Sterki)**

"Shell narrowly perforated, turreted-cylindrical, whitish, very minutely striate, shining; apex rather pointed, whorls 5, regularly increasing, rounded, the last somewhat narrowed and a little ascending towards the aperture, compressed at the base but not carinated, at some distance from the outer margin provided with an oblique, rather prominent, acute crest corresponding in direction to the lines of growth, extending from the base to the suture, formed by a whitish callosity; behind the crest the whorl is flattened, and corresponding to the lower palatal lamella, impressed. Aperture lateral, small, peristome moderately reflected; lamellæ 6; one parietal, rather long, very high, in its middle part curved outward, towards the aperture bifurcated, the outer branch (angular lamella) reaching the parietal wall; one columellar, longitudinal, rather high, its upper end turning in nearly a right angle towards the aperture, but not reaching the margin; basal exactly at the base, short, high and dentiform; lower palatal long, ending in a callus, highest about its middle; the upper short, rather high on the callus; above the upper one is a suprapalatal, quite small, dentiform, nearer the margin." Height 1.7 mm., width 0.8 mm. (Sterki, *in part*).

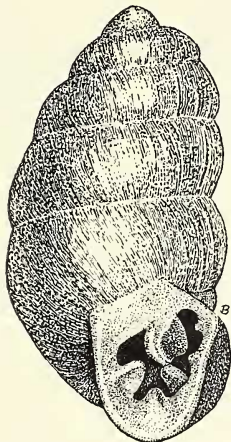
Type locality: Will County, Illinois ? (Sterki 1889).

Range: Western New York and Ontario, south to West Virginia and west to Kansas and New Mexico.

West Virginia record: Grant County; Petersburg (PR)

Gastrocopta holzingeri agna (Pilsbry and Vanatta)

Remarks: This species differs from *contracta* in its smaller size, its more cylindric appearance and by the presence of a strong basal fold. *Gastrocopta holzingeri agna* (Pilsbry and Vanatta 1907) was the first of this species to come to light and the illustration is of this form and not the typical *holzingeri*. It differs from the typical in being more



slender, and in the form of the columellar lamella, which ascends straightly and runs forward, while in *holzingeri* it ascends further and has an arched shape. Height 1.75 mm., width 1.0 mm. Described from Trinidad, Colorado. To state any range for this form would only be conjecture. In that it occurs in Colorado, Kansas, and West Virginia it would seem to be a racial form that may be derived from the parent species any place (?) within the limits of the distribution of that species.

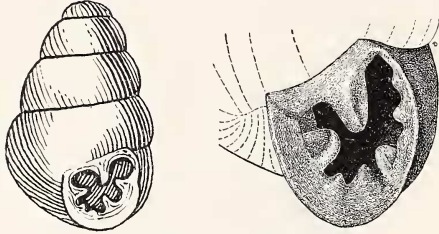
West Virginia record: Pendleton County; Upper Tract.

Subgenus VERTIGOPSIS "Cockerell" Sterki

This group is characterized by the weak parietal lamellæ, the angular may be small or wanting and the parietal short and simple. Pilsbry states that this group is not directly related to the other American groups of the genus as they seem to have been derived from the Asiatic group *Sinalbinula*. Forms are *Gastrocopta pentodon*, and *G. tappaniana*.

Gastrocopta pentodon (Say)

Shell clear horn color or whitish, oblong-conic with an obtuse apex; umbilicus slightly open; whorls five, convex, the body whorl with a crest parallel with and behind lip of aperture; aperture short with (typically) 5 teeth, the angular lamella simple, straight, columellar



lamella thin and horizontal, palatal folds situated upon a low ridge of callus, lower fold compressed, entering more deeply than the upper one; accessory denticles developed in the subcolumellar, basal and interpalatal positions. Height 1.5-1.8 mm., width 0.8-1.10 mm.

Type locality: "Pennsylvania" (Say 1821).

Range: Eastern Canada, south to Florida and west to Arizona.

West Virginia records

- Braxton County; Frametown, Gassaway
 Greenbrier County; Alderson (GMK, NDR), in part *gracilis*
 Hampshire County; Romney, in part *gracilis*
 Harrison County; Bristol—Lake Floyd (NDR)
 Jefferson County; Shenandoah City, Bardane, Shepherdstown,
 Leetown, Reedson, Kearneysville, Aldridge, Charles Town,
 Bolivar, Bloomery (MSB), some are *gracilis*
 Kanawha County; Tornado
 Marion County; Kingmont (GRH)
 Marshall County; Moundsville (VS)
 Monroe County; Alderson (*gracilis*) (GMK), Peter's Mountain
 (GRH)
 Monongalia County; Morgantown (HHS), Cooper Rock (NDR)
 Morgan County; Largent (GRH)
 Nicholas County; Craigsville, Lockwood, Summersville (*gracilis*)
 Pendleton County; Franklin (*gracilis*), Judy Gap (*gracilis*),
 Upper Tract
 Pocahontas County; Dunmore Spring, Greenbank, Hillsboro,
 Marlinton (GMK), Mill Point (GRH)

Remarks: This species is fairly easy to determine due to the blue-whitish color and smaller size. In West Virginia it is the most numer-

ous of this genus. However, for the amateur, it will at first be difficult to realize the great number of variations in the dentition of the shell that occur in this species. Mr. E. G. Vanatta (1906) has figured these in several plates in the "Nautilus" and in the "Manual of Conchology" and states that he could have added many more.

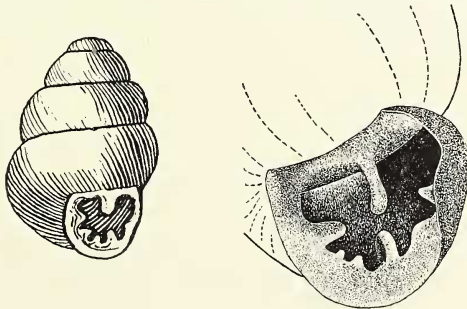
Gastrocopta pentodon (Say) form *curvidens* is figured here but as Pilsbry says (1916, Man. Conch.), "The increase in number of accessory denticles or teeth culminate in the form called *curvidens*, as there is absolutely no line to be drawn between *pentodon* and *curvidens*. It may be stated as proven that some colonies consist of "*pentodon*" and intermediate forms; some of "*pentodon*," intermediate and "*curvidens*" forms; and some of the intermediate and "*curvidens*" forms. We have found no large gathering of wholly typical *pentodon* or entirely *curvidens*."

Gastrocopta pentodon gracilis was described by Sterki from New Philadelphia, Ohio. He states that it is "long, slender, nearly cylindrical, with only 5 typical lamellæ, no accessory ones." It is a larger and more cylindrical shell than typical *pentodon*, and constitutes a large percentage of the West Virginian *pentodons*.

Neither of the forms seem to be important enough taxonomically to give them any special ranking in this short paper. It is to be seen, however, that this is an extremely variable species (*pentodon*), and should lend itself to studies of an ecological nature. Some very interesting quantitative studies in relation to habitat are available in a group of this kind.

Gastrocopta tappaniana (C. B. Adams)

Shell small, larger than *pentodon*, umbilicated, markedly conic but with obtuse apex; whorls 5 to $5\frac{1}{2}$, convex, suture well impressed; aperture suborbicular, the whorl above cutting off about one-third



of the circle, aperture one-third the length of the shell, thickened within with 5 or 6 palatal teeth situated upon the callus; parietal tooth large, strong, perpendicular; columellar tooth large, blunt. Height 1.7-2.0 mm., width 1.1-1.2 mm.

Type locality: Vermont (Adams 1842).

Range: Ontario, south to Alabama and west to Arizona.

West Virginia records

Greenbrier County; Alderson (NDR)

Hampshire County; Romney

Jefferson County; Bloomery, Charles Town, Kabletown, Lee-town (MSB)

Wetzel County; Siver Hill (NDR)

Remarks: This species may be confused with *pentodon*, but can be separated on the basis of its shape, size, and the arrangement of the teeth. The two species also differ in station (Pilsbry 1916), "*tappaniana* being found in low, moist places, under wood, often with *Vertigo ovata*, while *pentodon* lives in dryer situations." This species is not known from the southern Atlantic States. Dr. Sterki has described a shorter, more ovoid form from wet places in the region of New Philadelphia, Ohio, as the form *curta*.

Subgenus PRIVATULA Sterki

This subgenus is characterized by a single species; *Gastrocopta corticaria*.

Gastrocopta corticaria (Say)

Shell cylindrical, ovate, tapering to an obtuse apex; whorls $5\frac{1}{2}$, thin whitish and only faintly marked with growth lines; whorls convex, with no crest behind the lip of the aperture; aperture oval, lip thin, expanded and widely separated at the parietal extremities; angular and parietal lamellæ united into one, bilobed, small and not very conspicuous lamella; columellar lamella low, situated within the aperture. Height 2.5 mm., width 1.0 mm.

Type locality: "Philadelphia, Pa." (Say 1816).

Range: Ontario, south to Georgia and west to Minnesota.

West Virginia records

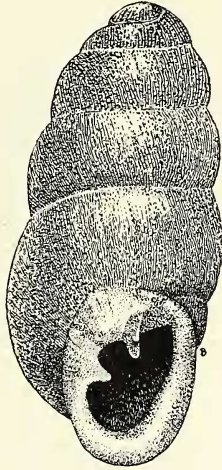
Jefferson County; Bloomery, Halltown, Reedson (MSB)

Monroe County; Alderson

Pendleton County; Franklin, Judy Gap, Upper Tract

Pocahontas County; Marlinton

Remarks: This is the most nearly toothless species in the genus. Dr. Pilsbry says that it may be found crawling upon trees a foot or



so above the ground and rarely occurs in great numbers. The latter is borne out by our collections in West Virginia although most of our specimens were from siftings. We believe that this is the first record from the southern Alleghenies as Upper Tract (our first locality) is at about 2000 feet altitude.

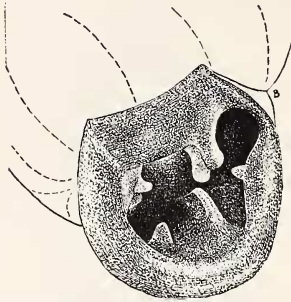
Subgenus GASTROCOPTA Wollaston

This subgenus is also characterized by a single species; *G. procera*.

Gastrocopta procera (Gould)

Shell cylindrical, with convex-conic apex, brownish, glossy and very irregularly and lightly striate; whorls $5-5\frac{1}{2}$, convex, the last flattened over the palatal fold, and impressed over basal folds with a low crest behind the lip; aperture with 5 teeth, parietal lamella sinuous, appearing bifurcate in front view which (appearance) is produced by the projection of the basal portion and the sinuosity of the lamella; columellar lamella stout, transverse, nearly a whorl long, below it a small tubercle may or may not be seen in the front view; upper palatal short, occurring exactly opposite the spur of the parietal and rather deep within; lower palatal longer, more deeply situated; basal fold short, as deeply situated as the upper palatal; strong, cinnamon-colored, callus ridge thickens peristome in front of the lip teeth but is

excavated near the upper insertion. Height 2.3-2.5 mm., width 1.0-1.1 mm.



Type locality: Baltimore, Maryland (Gould 1840).

Range: Maryland to Kansas and south to Alabama—north to Illinois, but not common north of the Ohio River.

Remarks: This will not be mistaken for *G. rupicola* for that is a lighter-colored shell, white lipped and less cylindrical.

Collected by M. S. Briscoe from ten localities in Jefferson County. So far it has not been found in the western part of the state.

Genus VERTIGO Müller

Shell small, ovate, glossy-brown, with an obtuse apex; aperture bears 6 teeth, typical of the Family, although any or all may be wanting and the angular lamella is not marginal if present; outer lip straightened or arcuate.

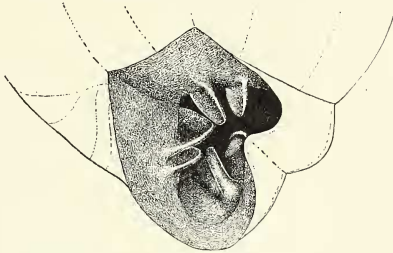
Subgenus VERTIGO Müller

Forms are *Vertigo clappi*, *V. morsei*, *V. ovata*, *V. elatior*, *V. gouldii*, and *V. tridentata*.

Vertigo clappi Brooks, S. T., and Hunt, G. R.

"Shell brown, shining, striated, striae forming slight riblets on the last two whorls; umbilicus open, deep; whorls $5\frac{1}{2}$, the last strongly constricted behind the lip; aperture biarcuate, small, only slightly expanded; upper palatal fold long, blade-like, curved, springing from the heavy ridge formed by the intersection of the two arcs but beginning quite far back of the lip; the two columellar lamellae are blade-like, rounded, similar in shape and lie horizontally and close together; infraparietal and angular lamellae prominent but due to the small size of the aperture are close together and closely approach the columellar

and palatal margins of the aperture." Height 1.5 mm., width 0.8 mm. (Brooks and Hunt, 1936).



Type locality: Renick, Greenbrier County, West Virginia.

Range: West Virginia.

West Virginia records

Greenbrier County; Renick (GRH)

Hampshire County; Romney

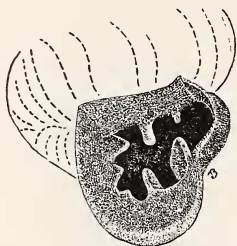
Pendleton County; Judy Gap

Remarks: Once seen this shell will never be confused with any of the others of West Virginia. The sculpture is like that of "*V. rugosula*," but the two columellar lamellæ are nearer together, the lower palatal fold is more immersed and differs also in shape and size. It appears nearer to *V. alabamensis* Clapp, a much more ventricose shell, with differently formed columellar lamellæ. The shape is unusual for this group of *Vertigo*" (Pilsbry in letter). Dr. George H. Clapp, after whom this species is named, is well known for his molluscan studies and for his great collection now in this museum. He is the Honorary Curator of Molluscs in the Carnegie Museum and, financially, made possible a part of the present study.

Vertigo morsei Sterki

Shell large, cylindrical-turriculate, with a rather acute apex, striæ sparse, obsolete, shining, translucent; six whorls, slowly increasing, last scarcely higher than penultimate; suture deep; aperture biarcuate, lip flared; on external palatal wall is a moderate crest, behind it a deep and large impression over the palatal folds, and toward the lip a deep groove corresponds to the intersection of the two arcs; inside is a distinct callus of the same color as the shell; typically 9 teeth, three on parietal wall (as in *ovata*), the largest whitish; two on the columella, the superior one strong, vertical above, the inferior one thin, high,

and directed obliquely upward; basal small, sometimes double, rarely absent; palatals high, long, curved and directed upward, suprapalatal



small, nodule-like (after Sterki). Height 2.7 mm., width 1.3 mm.

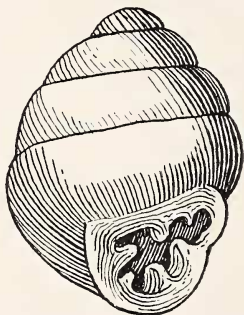
Type locality: Kent County, Michigan (Sterki, 1894).

Range: Michigan, Indiana, New Jersey, Illinois, Ohio, and West Virginia.

Remarks: This species stands close to *ovata* and is the largest *Vertigo* known. So far it has been collected only at Leetown, Jefferson County by M. S. Briscoe.

Vertigo ovata Say

Shell brown, ovate; whorls 5, suture impressed; aperture biarcuate, triangular-ovate, the intersection of the two circles forming an indentation near the lip of the body whorl; teeth five to none; one or two columellar lamellæ, two or three parietal lamellæ, and two to



five basal and palatal folds, in some only the two large palatals, one large parietal and one columellar lamella are present, the rest reduced to mere denticles or slight callus deposits. Height 2.2 mm., width 1.4 mm.

Type locality: "Philadelphia" (Say, 1822).

Range: Labrador, south to Alabama, west to Arizona, and north to

Alaska. Pilsbry states (1919): "*V. ovata* has the greatest range in latitude and climate of any *Vertigo* or other *Pupillid* snail in the world, as far as I know."

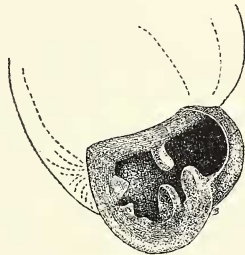
West Virginia records

Hampshire County; Romney
 Pendleton County; Judy Gap
 Summers County; Wolf Creek

Remarks: The shape of this species alone is sufficient to separate it from any of the others. A very characteristic form and we are surprised to find it so sparsely distributed in West Virginia.

Vertigo elatior Sterki

An umbilicated, ovate-conic shell, smooth, polished; 5 whorls, suture deep; aperture semicircular, slightly divided into two arcs,



with 5 teeth, one on the parietal wall; columellar lamella strong, oblique; basal fold small; two palatal folds, prominent, blade-like, the upper approaching the extremity of the parietal. Height 2.15 mm., width 1.2 mm.

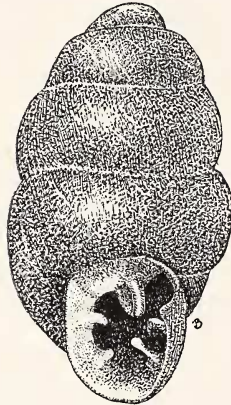
Type locality: New Philadelphia, Ohio (Sterki, 1894).

Range: From Maine, west to British Columbia, south to Mexico and West Virginia.

Remarks: Collected only in Jefferson County, Leetown, by M. S. Briscoe. This is a larger and more elevated shell than *V. ventricosa* (Morse), of which it was described as a subspecies by Sterki. Pilsbry says that it should now be considered as a species. The specimens at hand are undoubtedly from a marl deposit as they all have the appearance of being fossil or subfossil.

Vertigo gouldii (A. Binney)

Shell light chestnut-brown, shining; whorls 4-5 with oblique striæ, body whorl occupying nearly half of the total altitude of the shell, apex obtuse; aperture biarcuate, the two halves meeting in the center



of the outer lip; teeth 5, white, one on the transverse margin, two on the columellar and two on the palatal region; lip thickened, not reflected; umbilicus slightly open. Height 1.85 mm., width 1.0 mm.

Type locality: Brookline, Massachusetts (Binney, 1843).

Range: Quebec, south to Alabama and west to British Columbia.

West Virginia records

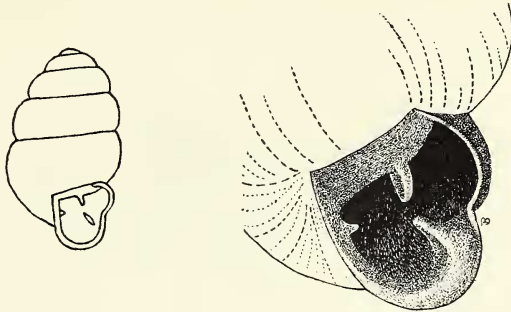
Greenbrier County; Alderson (GMK) (NDR)
 Jefferson County; Shenandoah City (MSB)
 Kanawha County; Tornado
 Marion County; Kingmont (GRH)
 Nicholas County; Summersville
 Pendleton County; Franklin, Judy Gap, Upper Tract
 Pocahontas County; Marlinton, Dunmore Spring
 Randolph County; Helvetia (VS)
 Summers County; Wolf Creek

Remarks: The surface of this species is very distinctly striate but the aperture is not as arcuated as one would suppose from the description.

Vertigo tridentata Wolf

Shell narrowly ovate to tapering oblong, honey yellow shading to brown, surface smooth, glossy, only very slightly striate; 5 whorls, the last slightly flattened externally over the lower palatal fold and

with a distinct crest behind the lip; outer lip projects forward and slightly inward near the middle; parietal lamella high, rather short; columellar lamella blunt, directed downward; lower palatal fold



strongly developed; upper palatal fold quite small or sometimes wanting; the latter stands upon a slightly distinct palatal callus; no angular or basal folds. Height 1.8-2.2 mm., width 1.1 mm.

Type locality: Canton, Illinois (Wolf, 1870).

Range: Quebec, west to Texas and, in the East, south to West Virginia.

Remarks: The single specimen observed by me is from M. S. Briscoe, Jefferson County, Reedson, and bears four teeth; the upper palatal being quite well-developed; five whorls of a greenish brown color, polished; the three teeth usually are enough to separate this species from the others. The author of the species collected it "in shady copses on green weeds, climbing as high as three feet from the ground. I collected 12,000 from standing weeds and not one from the ground, although it was searched well to find them."

Subgenus VERTILLARIA Pilsbry

Characters are the same as there is only one species of this group in America. It was originally described from Florida. The northern limits are indicated by the following locality from West Virginia. The only form; *V. oscariana*.

Vertigo oscariana Sterki

"This is the most peculiar of our species. It is the size of *milium*, but oblong with either end nearly equally pointed. The last whorl being considerably narrowed and flattened towards the (biarcuate) small aperture. Shell thin, delicate, of pale horn color, as is

the palatal wall and margin; the latter simple and straight, with a very slight, thin callus inside, lamellæ 3, whitish, rather small: one parietal (short and rather high), one columellar (blunt and thick with



the lower end vertical, the upper slanting slightly inward) and one lower palatal (which is set deep in the throat)." (Sterki). Height 1.5 mm., width 0.8 mm.

Type locality: Mosquito Island, Volusia County, Florida (Sterki 1890).

Range: Florida, west to Texas, north to West Virginia.

West Virginia records

Greenbrier County; Alderson
 Monroe County; Alderson
 Pendleton County; Franklin
 Summers County; Talcott

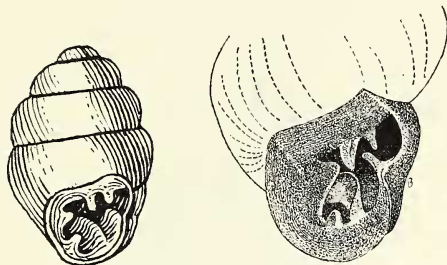
Subgenus *ANGUSTULA* Sterki

The characters are those of the species; *Vertigo milium*.

Vertigo milium (Gould)

Shell small, globosely-oval, color light cinnamon; whorls $4\frac{1}{2}$ to 5, wrinkled obliquely, convex, suture deep; apex bluntly rounded; aperture half the width of the last whorl, formed of two intersecting arcs; outer lip well marked with groove at intersection of arcs, rest of the lip simply arcuate, white, slightly everted; "angular lamella high, short, and situated inward from the insertion of the outer lip. The parietal is high and long, entering deeply. The high columellar lamella enters horizontally at first, then turns downward, being crescent shaped. (Its downward continuation was mistaken by Gould for a "tubercle at its base"). The upper palatal fold is long and high,

slightly curved. Lower palatal is a little immersed, high, thin, and enters to the dorsal side, where it curves downward. Both palatal folds are rather thick and tapering at their outer ends. The basal



fold is somewhat immersed, short and high. There is sometimes a small, tubercular suprapalatal fold." (Pilsbry). Height 1.4-1.75 mm., width 0.9-1.0 mm.

Type locality: Oak Island, near Chelsea, Boston, Massachusetts (Gould, 1840).

Range: Maine to Florida and west to Arizona and Mexico.

West Virginia records; Greenbrier County; Alderson (NDR); Hampshire County; Romney.

Genus COLUMELLA Westerlund 1887

This genus and the Genus *Vertigo* both belong under the subfamily *Vertigininae*. As a group these are characterized by the absence of the inferior tentacles. The shells of this group are compact, ovate or cylindrical, and all are of small size. The only species of the genus *Columella* that exists in our region is *C. edentula* described below:

Columella edentula (Draparnaud)

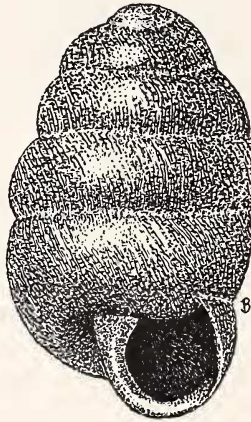
Shell small, oblong-cylindric, tapering only slightly to an obtuse apex, the last two whorls quite cylindrical; whorls smooth, thin, shining, dark or reddish-brown, but may have whitish streaks; whorls 5-6½, convex; aperture oblique, rounded, cut off above by the preceding whorl; lip thin, sharp, not expanded, toothless, the region near the columella reflected. Height 1.8-2.2 mm., width 1.1-1.35 mm.

Type locality: "France" (Draparnaud, 1805).

Range: A circumboreal species.

West Virginia records

Braxton County; Gassaway
 Hampshire County; Romney
 Jefferson County; Reedson (MSB)
 Nicholas County; Lockwood, Summersville
 Pendleton County; Franklin
 Pocahontas County; Marlinton, Mill Point
 Summers County; Talcott



Remarks: In the United States this species is rare in the southern states. In our collections from West Virginia it is sparse, one or two specimens only being found in each of the localities mentioned. They inhabit the soil rather than the surface although they may ascend bushes and trees during wet weather.

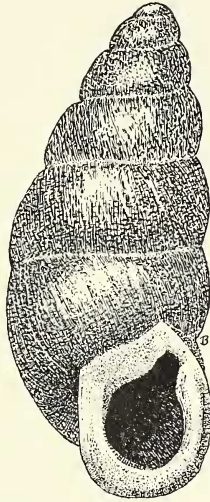
Genus PUPOIDES Pfeiffer 1854

The genus *Pupilla*, which is found in so many of our northern states, has not yet been found in our area. Species of the genus *Pupoides*, which with *Pupilla* is contained in the subfamily *Pupillinae*, are characterized by the presence of the inferior tentacles and by the large size of the shell.

Pupoides marginatus (Say)

Shell only minutely perforate, elongate-ovate, slowly tapering to an obtuse apex; $5\frac{1}{2}$ to 6 whorls, brownish and only slightly marked with striae, convex, the last somewhat compressed and tapering to the

narrowly rounded base; aperture ovate; lip reflected, expanded, strongly thickened within and strongly arched near the upper columellar insertion, its internal callus excavated and narrowed there. Pari-



tal callus rather strong but transparent, bearing a short angular tubercle connected with the outer lip. Height 5 mm., width 2.2 mm.

Type locality: "Upper Missouri" (Say, 1821).

Range: Ontario to the Gulf of Mexico and west to Colorado and Arizona.

West Virginia records

Hampshire County; Romney

Jefferson County; Bloomery, Bardane, Meyerstown, Summit Point, Shepherdstown, Keystone, Bakerston, Middleway, Mechanicstown, Leetown, Kearneysville, Aldridge, Morgan Grove, Jamestown, Kabletown, Halltown, Charles Town (MSB)

Pendleton County; Judy Gap

Remarks: One will hardly confuse this species with any other of the *Pupillidæ* as its shape and the toothless aperture easily separate it. Many of the specimens from West Virginia vary slightly from the description, being narrower and shorter.

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